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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/825,946	04/16/2004	Stephen Charles Hsu	SAR 14920	8208
28166	7590	01/30/2006	EXAMINER	
MOSER, PATTERSON & SHERIDAN, LLP /SARNOFF CORPORATION 595 SHREWSBURY AVENUE SUITE 100 SHREWSBURY, NJ 07702			ALSOMIRI, ISAM A	
			ART UNIT	PAPER NUMBER
			3662	

DATE MAILED: 01/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/825,946	<b>Applicant(s)</b> HSU ET AL.	
	<b>Examiner</b> Isam Alsomiri	<b>Art Unit</b> 3662	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 10 November 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) 19-26 and 33 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6-11, 13-18, 27-29 and 32 is/are rejected.
- 7) ☒ Claim(s) 4, 5, 12, 30 and 31 is/are objected to.
- 8) ☒ Claim(s) 1-33 are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 1-3, 27-29, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumar et al. US2001/0038718 in view of Miller et al. US 5,652,717 or Pack et al. US 20020060784A1.**

Referring to claims 1, 27-28, and 32, Kumar discloses in figures 1-9 a method of registering camera images "frames", comprising: receiving a plurality of camera images; and registering at least two of said plurality of ladar frames for determining a sensor pose with respect to a reference (see Abstract). Kumar does not teach the claimed "ladar frames" or receiving Ladar images. Miller and Pack both teach similar system where both use Ladar devices to capture ladar images. It would have been obvious to modify Kumar's system to use Ladar images for better and accurate images that can also be used as range images.

Referring to claim 2. Kumar teaches the registering step uses information provided by a Global Positioning System GPS (see page 2 [0041]).

Referring to claims 3 and 29, Kumar teaches the registering step comprises: performing a coarse search for determining a translation shift; and performing a fine registration (see [0034] [0046])

**Claims 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumar et al. US2001/0038718 in view of (Miller et al. US 5,652,717 or Pack et al. US 20020060784A1) and Hsu et al. US006078701A.**

Referring to claims 15-16, Kumar is silent about the sensor pose is determined using a bundle approach, where pairwise registration is performed on said plurality of ladar frames separated by different temporal distances. Hsu teaches the claimed pairwise registration (see col. 10 lines 34+). It would have been obvious to modify Kumar to include the pairwise registration for accurate alignment between the neighboring frames.

**Claims 6-11 and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumar et al. US2001/0038718 in view of (Miller et al. US 5,652,717 or Pack et al. US 20020060784A1) and Burt et al. US005999662A.**

Regarding claims 6-11, the combination (Kumar in view Miller or Pack) is silent about the fine registration step employs an iterated closest points for; eliminating false matches; extrapolated point to compute motion; removes points in either ladar frame on an interior of a smooth densely sampled surface from consideration; ignores closest point pairs within said at least two ladar frames with distance exceeding a Limit. Burt

discloses in figure 6 the fine registration step employing an iterated closest points for; eliminating false matches 612, 304; extrapolated point to compute motion 608 (see Abstract); removes points in either ladar frame on an interior of a smooth densely sampled surface from consideration (see col. 12 lines 1-10); ignores closest point pairs within said at least two ladar frames with distance exceeding a Limit 612. (see col. 11 line 32 – col. 12 line 20). It would have been obvious to modify Kumar to include the ICP methods to eliminate errors in the images.

Regarding claim 13, the combination (Kumar in view Miller or Pack) do not teach a) creating a point cloud from said at least two ladar frames at a plurality of resolution levels; and b) performing said ICP method at each of said plurality of resolution levels. Burt teaches creating a point cloud from said at least two ladar frames at a plurality of resolution levels; and performing said ICP method at each of said plurality of resolution levels (see figures 4 and 6, col. 11 line 32 – col. 12 line 20). It would have been obvious to modify the combination to include the ICP methods to eliminate errors in the images.

Referring to claim 14, the combination (Kumar in view Miller or Pack) is silent about the sensor pose is determined using a hierarchical approach, where groups of nearby ladar frames are first registered and then are aggregated into composite point sets. Burt teaches the claimed hierarchical approach (see figure 2c, col. 6 lines 8-12). It would have been obvious to modify Kumar to include the hierarchical approach for fast and better image combining.

**Claims 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over anyone of Lee et al. US005995681A, Fling US005251271A, or Vashisth et al. US006759979B2.**

Referring to claims 17-18, the combination (Kumar in view Miller or Pack) is silent about having static noise cleaning performed before the registering step, or dynamic noise cleaning performed before the registering step. However, noise cleaning is inherently done in the system prior to the registering step, and it would have been obvious to have static noise cleaning or dynamic noise cleaning depending on the system and which are both very well known method in the art for noise cleaning to obtain better images.

***Allowable Subject Matter***

Claims 4-5, 12, and 30-31 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Response to Arguments***

Applicant's arguments with respect to claims 1-3, 6-11, 13-18, 27-29, and 32 have been considered but are moot in view of the new ground(s) of rejection.

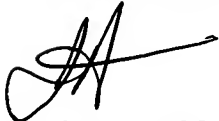
***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Isam Alsomiri whose telephone number is 571-272-6970. The examiner can normally be reached on Monday-Friday 8:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Tarcza can be reached on 571-272-6979. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Isam Alsomiri



January 22, 2006



THOMAS H. TARCZA  
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